Toji
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SOFC–XVI

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Kyoto, Japan

Kyoto Terrsa

Sagano
嵯峨野

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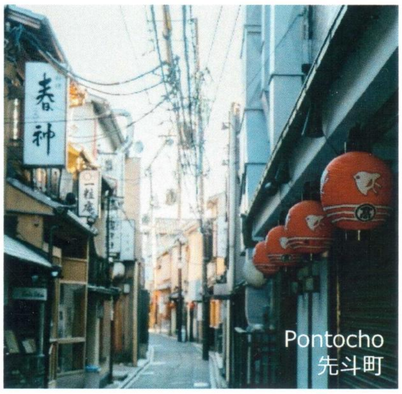

Pontocho
先斗町

Fushimi Inari Taisha
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Wednesday, September 11, 2019

Room A

Solid Oxide Electrolysis and Reversible Cells and Systems I

Co-Chairs: Anke Hagen and Tatsumi Ishihara

9:00	OA33	**Co-Electrolysis of Biohythane Using Solid Oxide Fuel Cell Technology** K. Panagi, C. J. Laycock, J. P. Reed, and A. J. Guwy (University of South Wales)
9:20	OA34	**A Simple Approach to Enhance the Direct Production of Methane through Co-Electrolysis of CO_2 and H_2O** M. Lo Faro Sr., S. C. Zignani, S. Trocino, and A. S. Aricò (CNR-ITAE Institute)
9:40	OA35	**Preparation and Performance of Sr-Co Free Perovskite-Type Oxide $La_{0.6}Ca_{0.4}Fe_{0.8}Ni_{0.2}O_{3-\delta}$ as an Oxygen Electrode for Reversible Solid Oxide Electrochemical Cell** Y. Tian, Y. Liu, W. Wang, L. Jia, B. Chi, J. Pu, and J. Li (Huazhong University of Science and Technology)
10:00	OA36	**Transition Metal Elements as Ni/GDC Dopants for the H_2O Electrolysis Process in SOECs: Fe-Ni vs Au-Mo-Ni Interaction** C. Neofytidis, E. Ioannidou (FORTH/ICE-HT, University of Patras), S. G. Neophytides, and D. K. Niakolas (FORTH/ICE-HT)
10:20		Break
10:40	OA37	**Influence of A-Site Deficiency, Porous Electrolyte Scaffold and Loading of MIEC Material on the Performance of $La_{0.8}Sr_{0.2}Cr_{0.5}Mn_{0.5}O_{3-\delta}$ Based R-SOC Fuel Electrode** M. Maide, P. Möller, G. Nurk, and E. Lust (University of Tartu)
11:00	OA38	**Further Improvement of Performances and Durability of Oxygen and Hydrogen Electrodes for Reversible Solid Oxide Cells** H. Uchida, H. Nishino, K. Kakinuma, and M. E. Brito (University of Yamanashi)
11:20	OA39	**Oxygen-Deficient $Nd_{0.8}Sr_{1.2}Ni_{0.8}M_{0.2}O_{4-\delta}$ (M = Ni, Co, Fe) Nickelates as Oxygen Electrode Materials for SOFC/SOEC** B. I. Arias-Serrano (University of Aveiro), E. Kravchenko (Belarusian State University), K. Zakharchuk (University of Aveiro), J. Grins, G. Svensson (Stockholm University), V. Pankov (Belarusian State University), and A. Yaremchenko (University of Aveiro)
11:40	OA40	**Perovskite-like $LaNiO_{3-\delta}$ as Oxygen Electrode Material for Solid Oxide Electrolysis Cells** A. Yaremchenko, B. I. Arias-Serrano, K. Zakharchuk, and J. R. Frade (University of Aveiro)

Oxygen-Deficient $Nd_{0.8}Sr_{1.2}Ni_{0.8}M_{0.2}O_{4-\delta}$ (M = Ni, Co, Fe) Nickelates as Oxygen Electrode Materials for SOFC/SOEC

B.I. Arias-Serrano[a], E.S. Kravchenko[b], K. Zakharchuk[a], J. Grins[c], G. Svensson[c], V. Pankov[b], A.A. Yaremchenko[a]

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Ruddlesden-Popper $Nd_{0.8}Sr_{1.2}Ni_{0.8}M_{0.2}O_{4\pm\delta}$ (M = Ni, Co, Fe) nickelates have been characterized as prospective oxygen electrode materials for solid electrolyte cells. XRD studies showed that these oxides retain tetragonal K_2NiF_4-type structure in air until at least 900°C. Average thermal expansion coefficients of $Nd_{0.8}Sr_{1.2}Ni_{0.8}M_{0.2}O_{4\pm\delta}$ calculated from the structural data are in the range 14.5-15.8 ppm/K. TGA studies revealed that these nickelates are oxygen-deficient in air at temperature above 700°C but tends to oxygen stoichiometry or minor excess on cooling. Incorporation of cobalt or iron into nickel sublattice of $Nd_{0.8}Sr_{1.2}NiO_{4-\delta}$ reduces oxygen deficiency and electrical conductivity. Electrochemical impedance spectroscopy studies of symmetrical cells showed that porous $Nd_{0.8}Sr_{1.2}Ni_{0.8}M_{0.2}O_{4-\delta}$ electrodes applied onto $Ce_{0.9}Gd_{0.1}O_{2-\delta}$ electrolyte exhibit quite similar performance, with lowest values of polarization resistance (0.8 Ohm×cm^2 at 800°C) observed for M = Ni. The polarization resistance can be further decreased (down to 0.04 Ohm×cm^2 at 800°C for M = Ni) by surface modification with PrO_x.